

Clark from that of the firm with which he was associated throughout his life. It would be ungenerous to deny him his share in the success that has attended the use of such astronomical triumphs as the Washington telescope, the Pulkova, or the Lick, because they were completed in his father's lifetime. His practical participation in the work of the firm as far back as 1862, is attested by his discovery of the companion of Sirius in the course of the optical trials to which he was submitting the first large telescope the firm had constructed. Here his capacity to use a telescope is shown as effectually as he afterwards demonstrated his power to make one, and though the opportune discovery may have done much to strengthen the reputation of the firm, it did not tempt him to join the ranks of astronomical observers in preference to those of the practical optician. Possessed with the tradition of the workshop, and inheritor of his father's skill and experience, he has been content to supply the means for others to use, and in this way has rendered no mean service to astronomical science. None of those who have won an acknowledged position for accurate or for delicate work by means of the instruments the famous house of A. Clark and Sons has placed in their hands, would deny the obligation they are under to those who have devoted themselves freely and unselfishly to secure the best that art can devise, or skill and patience execute. In precisely the same manner Mr. Clark would acknowledge his indebtedness to those who have supplied him with the glass, out of which he has constructed those lenses, wherewith he has broken the record of all previous efforts in the same direction. The house of Feil, among others, has rendered him the same kind of service that he has rendered to astronomy—services that are not covered by a mere monetary payment. When we hear of the discovery of some minute speck of light, and admire the skill and dexterity of manipulation of the astronomer who has added another fact to the history of observational astronomy, it is well to remember all the causes that have contributed to his success, not to rob him of his deserved popularity and reputation, but to remind ourselves of the intimate connection pervading many branches of science and industry.

We have alluded to some of the large telescopes in which the reputation of the son is worthily joined with that of the father. We may recall another, the Bruce photographic telescope, whose successful figuring rests entirely with the younger Clark. Here the difficulty of construction was much increased by the fact that the final focal length of the combination was agreed upon between the contracting parties, and that very considerable accuracy was demanded in maintaining the original agreement. Mr. Clark triumphed over all difficulties, we believe, to the complete satisfaction of Prof. Pickering, and, if we correctly understood Mr. Clark, without the assistance of the method of "pilot" glasses or small objectives, constructed of similar glass and of like curves to those intended to be used in the construction of the finished lenses.

America has lost, perhaps, her ablest practical optician. Others starting with his experience and assisted by a lavish generosity will no doubt in time surpass his masterpieces; but his loss is a great one, and at this particular juncture will be keenly felt in the new Chicago Observatory.

NOTES.

THE sum of 297,000 francs has been subscribed for the Pasteur statue which is to be erected in Paris. M. Falguières has been commissioned to design the statue.

AT the meeting of the Paris Academy of Sciences last week, it was announced that subscriptions amounting to twenty-five

thousand francs had been collected in Russia towards the fund for the erection of a statue of Lavoisier, and that this sum had been forwarded to the Academy.

THE International Postal Union has decided that natural history specimens and objects for scientific collections, shall be regarded as samples, and charged at the rate of a halfpenny for every two ounces.

WE learn from the *Bulletin* of the Botanical Society of France that it is intended to recognise in perpetuity the services rendered to viticulture in France by the late botanists, M. P. Duchartre and M. F. Laforge, by placing commemorative marble plates on the houses where they were born, both in the neighbourhood of Béziers.

IT is stated in *Science* that Miss Catherine W. Bruce, of New York City, has again shown her great interest in astronomy by sending Prof. J. K. Rees, Director of the Columbia University Observatory, a cheque for fifteen hundred dollars. The money is to be used in publishing the observations and reductions for "Variation of Latitude and the Constant of Aberration," made by Profs. Rees and Jacoby and Dr. Davis.

DR. G. SANARELLI delivered a lecture at Montevideo on Thursday last, upon the etiology and pathogenesis of yellow fever, with special reference to the yellow fever bacillus discovered by him (see *NATURE*, February 18, vol. lv. p. 370). There was a very large attendance at the lecture, including a number of scientific delegates from all parts of South America, the members of the Diplomatic Body, and the principal authorities. Dr. Sanarelli confirmed his previous announcement that the cause of yellow fever is a bacillus named by him *icteroid*, which is rarely found either in the blood of yellow fever patients or in their bodies after death, because it easily disappears. Dr. Sanarelli said that he would shortly make experiments in preventive vaccination, and hoped to discover a curative serum.

THE Council of the Royal Society of Edinburgh have awarded the following prizes:—The Gunning Victoria Jubilee Prize for 1893-96 to Mr. John Aitken, for his brilliant investigations in physics, especially in connection with the formation and condensation of aqueous vapour; the Keith Prize for 1893-95 to Dr. Cargill G. Knott, for his papers on the strains produced by magnetism in iron and in nickel; the Mackdougall-Brisbane Prize for 1892-95 to Prof. John G. M'Kendrick, for numerous physiological papers, especially in connection with sound; the Neill Prize for 1892-95 to Mr. Robert Irvine, for his papers on the action of organisms in the secretion of carbonate of lime and silica, and on the solution of these substances in organic juices. The prizes will be presented by Lord Kelvin at the last meeting of the session, July 5.

WE regret to announce the following deaths:—Dr. Matthew Charteris, professor of *materia medica* in Glasgow University; Mr. Alvan Clark, the well-known manufacturer of lenses for telescopes; Prof. Dr. R. Fresenius, the distinguished chemist; Mr. Ney Elias, who won the gold medal of the Royal Geographical Society about twenty-five years ago, for his journey from Peking to St. Petersburg, and since then explored a part of the desert of Gobi, and traversed the Pamirs; Rev. Alexander Freeman, a Fellow of the Royal Astronomical, Mathematical, and Physical Societies, and deputy for the Plumian Professor of Astronomy at Cambridge in 1880-82; the distinguished Austrian metallurgist, Prof. Peter von Tunner, at the age of eighty-nine. In 1875 he was elected an honorary member of the Iron and Steel Institute, and in 1878 received from that society the Bessemer Gold Medal in recognition of his important discoveries connected with the metallurgy of steel.

A VERY severe shock of earthquake was felt at Calcutta, at 5 o'clock last Saturday afternoon, June 12. It is stated that, from first to last, the disturbances continued for fully five minutes. Few houses escaped damage of some description, and many are in ruins. Many church towers and spires collapsed, and most of the public buildings were badly damaged by the disturbances. Reuter's agency reports that the area affected by the earthquake was very extensive. Telegrams received from Simla, Agra, Bombay, Manipur, and from places far down in the Central Provinces, report that a shock was felt almost at the same time as the earthquake occurred at Calcutta. The shock appears even to have left its record on seismometers on this side of the earth. Prof. Milne obtained at Newport, Isle of Wight, on Saturday morning, a seismographic diagram of an earthquake of unusual magnitude. It began at about 11.30 a.m., and lasted three hours. Further, a Reuter telegram from Paris states that the seismograph at Grenoble registered an earth tremor at 11.28 on Saturday morning. Both these records evidently refer to the Calcutta earthquake.

PRESIDENT MCKINLEY has transmitted to the Senate the report on forestry made by the Committee of the National Academy of Sciences at the request of the Secretary of the Interior. The following general scheme of administration of forest preserves is submitted:—A forestry bureau under a director, who is to be president of an advisory board, consisting of himself, an assistant director, and four forest inspectors. It also provides that the bureau shall have a disbursing officer, clerks, and legal advisers; twenty-six head foresters, twenty-six assistants, to constitute a permanent corps; two hundred rangers and various assistant rangers, the salary roll calling for an annual appropriation of 250,000 dollars, with preference of appointment to West Point graduates. The Legislature of the State of New York at its recent session granted one million dollars for the purchase of forest preserves in the Adirondachs; and a surveyor has just been appointed to survey the lands about Indian Lake, in order to acquire them for the State under this Act.

THE great anthropological expedition sent out by President Morris K. Jesup, of the American Museum of Natural History, left New York for British Columbia a few days ago, in charge of Dr. Franz Boas, curator of the anthropological section of the museum. His associate, Mr. Harland J. Smith, preceded him, and Dr. Livingstone Farrand, of Columbia University, accompanies him. The headquarters of the expedition will be situated in British Columbia, where about thirty Indian dialects are spoken. The language and habits of the Indians will be carefully studied, and elaborate anthropometrical observations made. Mr. Smith will engage in archaeological researches in the southern portion of the territory, and several other parties will be scattered throughout British Columbia. An expedition to Alaska is contemplated for next spring; also, at some time in the near future, an expedition to Southern Siberia. All this work is under the general supervision of Prof. F. W. Putnam, though he will not take the field in person, at least for the present; the field work being under the direction of Dr. Boas.

It has been briefly announced that next year Captain Sverdrup proposes to take the *Fram* up Smith Sound to the north-west coast of Greenland for the purpose of prosecuting exploration in that direction. Though Dr. Nansen will not accompany the expedition, the *Times* states that there is reason to believe that he is taking an active share in the direction of the expedition. The object will be to penetrate north through Smith Sound and Robeson Channel as far north as possible along the north-west coast of Greenland. An attempt will be made to discover how far Greenland extends northward, and to survey the north-west, north, and north-east coasts. In short,

one prime object will be to complete the exploration of the Greenland coast, a considerable extent of which is still quite unknown.

LIEUT. PEARY has been detached from duty at the Brooklyn Navy Yard, and granted five years' leave of absence in order to enable him to prosecute his Arctic researches. He expects to begin the first trip on July 10, sailing from Boston, and will be away three or four months. Prof. C. H. Hitchcock, of Amherst, and Prof. Geo. H. Barton, of the Massachusetts Institute of Technology, will accompany him, and also, probably a party from Yale. The route will be from Boston to Sydney, U.S., thence through the Gulf of St. Lawrence and the Belle Isle Straits to Resolution Island and the Greenland coast, then along the coast 1200 miles to Melville Bay. The scientific parties will be landed on the way, and picked up by the ship on its return trip in September. The main object of this trip is to prepare for a longer one of three or four years to be undertaken next year, and to attempt to reach the Pole by gradual approaches, and colonising Eskimos in high latitudes. Lieut. Peary states that he is assured of funds sufficient to prosecute the work for five years if need be, but the name of the donor is withheld. The scheme, however, has the endorsement of the American Geographical Society and the American Museum of Natural History.

THE results of a preliminary study of the conditions which exist in highly rarefied media under discharges of electricity are described, by Prof. John Trowbridge, in a paper entitled "The Energy Conditions necessary to produce the Röntgen Rays" (*Proc. Amer. Acad. of Arts and Sciences*, vol. xxxii. No. 14, April 1897). It appears from the experiments "that the discharge in a Crookes' tube, when on the point of emitting the Röntgen rays most intensely, is an oscillatory one, and that each discharge encounters a resistance less than five ohms. An estimate of the great amount of energy thus developed in an exceedingly small interval of time can be obtained if we suppose that Ohm's law holds for individual oscillations. This reservation is an important one, for the investigations I have described in this paper show that a discharge of six inches in length encounters no more resistance during its oscillations than one of two inches in length. In popular language, it can be maintained that a discharge of lightning a mile long encounters no more resistance than one of a foot in length. Ohm's law does not hold good for electrical discharges in air and rarefied gases. It is well known that a voltaic arc can be started in a vacuum. My experiments lead me to believe that in every case the arc is started by a spark which breaks down the medium, and the arc follows. I am led to believe that electrical oscillations are of the nature of voltaic arcs, and that the discharges in Crookes' tubes are voltaic arcs. I am thus forced to the conclusion that under high electrical stress the ether breaks down and becomes a good conductor."

DR. H. H. HILDEBRANDSSON, Director of the Meteorological Observatory at Upsala, has recently communicated to the Royal Swedish Society of Sciences the results of an important investigation upon the "Centres of action of the atmosphere," or the regions at which are situated the mean barometric maxima and minima. The monthly differences of the pressure of the air from the mean, as being the principal meteorological element, were calculated for the years 1875-84 at sixty-eight stations, distributed as widely as possible over the surface of the globe; the mean differences were then plotted upon monthly charts. The results obtained from the lines of equal differences show: (1) That the differences are greater in winter than in summer, and increase from the equator towards the polar regions, and also that the barometrical variations at certain localities, *e.g.* at the Azores and in the vicinity of Iceland, are

almost always opposite in sign, especially when the figures are large. (2) That the greatest differences are found in January and July in the vicinity of Greenland and Iceland on the one hand, and to the north of Russia, between the White Sea and St. Peter burg, on the other. The discussion seems to establish the fact that a kind of oscillation exists at all places in the pressure of the air between a centre of action of high pressure and another adjacent centre of low pressure. The author states that a closer study of these relations promises to lead to practical results for the prediction of weather for long periods.

THE current number of the *Annales de l'Institut Pasteur* contains M. Pottevin's annual report for 1896 on the anti-rabic inoculations conducted during the past year at the Paris Pasteur Institute. The number of persons treated was 1308, less than in any previous year since the Institute was opened. This diminution is attributable to the fact that patients, instead of going to Paris from all parts of the country, undergo the inoculations at the institutes now established at Lille and Marseilles; also similar institutes have been founded in Algiers and Turin, districts which formerly sent considerable numbers of cases to Paris. During the ten years which have elapsed since the opening of the Paris Institute, 18,645 persons have been treated there, and an interesting table is appended showing the nationality of the patients, from which it appears that England contributed no less than 870 individuals, and more than any other country; Belgium coming next, with 429. In some of the departments of France cases of rabies have steadily diminished, thanks to the energetic measures taken by the local authorities; whilst in others, where less vigorous steps have been taken to guard against its dissemination, the number of cases has increased. It is in the southern districts of France that, M. Pottevin tells us, "possess the sad distinction of containing the largest number of bitten persons, and of paying the most dearly for disobedience to the laws of the sanitary police."

IN north latitude $70^{\circ} 40' 11''\cdot 3$, where the most northerly town in the world—namely, Hammerfest—is situated, there is a monument which was visited by most of those who went to Norway to obtain a view of the total solar eclipse. This monument consists of a fine granite pedestal and pillar supporting a large terrestrial globe made of copper, and was placed there to commemorate the completion of a grand piece of surveying work. The primary object of this survey was, as Mr. Fowler writes in an interesting article in *Knowledge* (June), the measurement of the earth, and to provide a permanent mark in order that the measurements may be repeated at any future time if considered desirable. Without entering into the details of a trigonometrical survey, and how a triangulation is accomplished, we will limit ourselves to the inscription, written in Latin and Norwegian, on the pillar, referring the reader to the article in question for details. "The northern termination of the arc of meridian of $25^{\circ} 20'$ from the Arctic Ocean to the river Danube, through Norway, Sweden and Russia, which, according to the orders of His Majesty King Oscar I., and the Emperors Alexander I. and Nicholas I., and by uninterrupted labours from 1816 to 1852, was measured by the geometers of the three nations."

PROF. P. TACCHINI, of Rome (*Atti dei Lincei*, vi. 9), describes a remarkable thunderstorm which passed over Italy on April 24, in which the rain was mixed with sand and seeds of the *caroub* that had evidently been transported from Africa.

In a preliminary note published in the *Rendiconto della R. Accademia delle Scienze fisiche e Matematiche* (Naples), Dr. R. V. Matteucci and Dr. E. Giustiniani announce the discovery for the first time of the element selenium among the products of the "fumaroli" of Vesuvius. Dr. Matteucci has also completed a brief but accurate investigation of the dynamical phenomena

connected with the eruption of 1895, of which he gives an account in the same journal.

FROM a series of investigations on the effect of cutaneous excitations on the formation of red blood-corpuscles, Prof. H. Kronecker and Dr. A. Marti, writing in the *Atti dei Lincei*, draw the following conclusions: (1) Feeble irritations of the skin promote the formation of red blood-corpuscles, but modify the formation of hæmoglobin in different ways. (2) Strong irritations of the skin determine a diminution of the number of red corpuscles, and, in a minor degree, of the hæmoglobin contained in the blood. (3) Darkness diminishes the number of blood-cells; after about a fortnight, a minimum is reached which is followed by a limited increase. (4) Continued exposure to intense light (even at night with electric light) induces the formation of red blood-corpuscles, and also, in a lesser degree, of hæmoglobin.

A RÖNTGEN Society has been formed, with Prof. S. P. Thompson as the president. The intention of the founders is that the Society shall occupy a position between those devoted purely to medicine, to physics, or to photography. Some of the members will study the sources of the Röntgen rays, others the applications; some the induction coils, others the tubes and the various forms and adaptations of the apparatus used in the production of the rays. Röntgen photography has been found serviceable in so many branches of scientific investigation that the Society appeals to a large constituency for support. It should be the means of increasing the efficiency and applications of the rays, and should also be of assistance to surgeons and others who have entered the new field of work without previous training in physics.

TO the June number of the *Strand Magazine*, and also to *McClure's Magazine*, Prof. S. P. Langley contributes an interesting illustrated narrative of his experiments with flying machines, and the development of the aerodrome to the condition in which it was able to demonstrate the possibility of mechanical flight. A description of the aerodrome was given by Prof. Langley in these columns a year ago (vol. liv. p. 80, May 28, 1896), and the first successful flight of the machine was then described by Mr. Alexander Graham Bell.

ANOTHER name must be added to the long list of martyrs who have given up their lives while endeavouring to effect the conquest of the air. The latest victim is Dr. Wölfert, who had devoted many years to the problem of aerial navigation, and who claimed to have invented a navigable balloon. The Berlin correspondent of the *Times* says that Dr. Wölfert had made an arrangement with the officers of the ballooning section of the army to put his invention to a practical test at Tempelhof on Saturday last. The officers and a number of persons interested in aerial navigation assembled to witness the ascent. The balloon was of the new cigar-shaped form. The car was a square basket made of bamboo cane, and contained a benzene motor of eight-horse power, partly constructed of aluminium, and driving at one end of the car a propeller of the same material. At the other end of the car was a so-called helm, consisting of bamboo staves covered with linen sails. The balloon had already been tested on several occasions, and was said to have attained a very high rate of speed against the wind. Dr. Wölfert was accompanied in his ascent by a mechanic named Knabe. At first the balloon ascended steadily and began to make good progress against the wind in the direction of the suburb of Rixdorf, to reach which and to return to Tempelhof was the task set himself by its inventor. Suddenly, however, when the balloon was sailing at a height of about 1000 feet, flames shot up from the car and the balloon exploded with a loud report and was precipitated, a burning mass, into a wood-yard below. The

mounted officers hurried to the spot, and, after the flames had with great difficulty been partially extinguished, the mutilated remains of Dr. Wölfert and his companion were found amidst the ruins of the car. It is believed that the valve of the balloon was opened with the intention of descending, and that the gas, in escaping from the balloon, became ignited by the benzene.

ALL who work for the advancement of natural knowledge have reason to be grateful to the Smithsonian Institution. Under the administration of this renowned organisation come the U.S. National Museum, the Bureau of Ethnology, the Bureau of International Exchanges, the National Zoological Park, and the Astro-physical Observatory—all of which have largely contributed to the progress of science. By the exchange service the operations of the Institution extend almost to the ends of the world. How immense this branch of the work now is may be gathered from the fact that more than 24,000 correspondents are upon the exchange lists, about eleven thousand being establishments and thirteen thousand individuals. The correspondents are distributed in nearly four thousand different places, from Disco, Greenland, in north latitude 70°, to Port Stanley, Falkland Islands, in latitude 50° S.; and they extend east and west so as practically to embrace the earth. The distribution of the correspondents is indeed proportional to the spread of civilisation, and the educational status of Spain as compared with France, or China in comparison with Japan, can be rightly inferred from their relationships with the Smithsonian Institution alone.

ANOTHER work for which the Smithsonian Institute deserves the gratitude of men of science is the general appendix now printed with the Report of the Secretary. This appendix preserves for us year by year a number of very valuable papers, covering a considerable range of scientific investigation and discussion. The collection of carefully selected contributions usually contains the most important and interesting articles and addresses which were published during the year covered by the Report in which they are included. The volume just received contains thirty contributions of this character, gathered from the published literature of 1895. There are several papers which won prizes or commendation in the Hodgkins Prize Fund competition; addresses delivered at the Ipswich meeting of the British Association by Prof. W. A. Herdman and Mr. W. T. Thiselton-Dyer; a translation of a discourse by Prof. W. Ludwig von Graff on "Zoology since Darwin," and other translations from German and French journals; several papers on American archeology; a translation of the address delivered by the late M. Jules Simon at the centenary celebration of the Institute of France; a paper on science in early England by Mr. C. L. Barnes; a paper on the plan of research in education, contributed to *Science Progress*, by Dr. H. E. Armstrong; and a memorial address on Huxley, by Prof. Theodore Gill. These are but a few of the subjects of the reprinted publications; but they suffice to show the comprehensive character of the collection, and will serve to call attention to a veritable storehouse of information.

"THE ELECTRICIAN" Company are about to issue a work by Mr. W. Clark Fisher on the "Potentiometer and its Adjuncts," being a description of a universal system of electrical measurement.

MR. A. W. BENNETT has been appointed by the Council of the Royal Microscopical Society editor of the Journal of the Society, in succession to Prof. F. J. Bell.

THE Geological and Natural History Survey of the Chicago Academy of Sciences has issued its first "Bulletin," consisting

of a monograph of the Lichen-flora of Chicago and its vicinity, by Mr. W. W. Calkins.

M. J. CARDOT (Stenay, Meuse, France) is about to publish a catalogue of all the species and varieties of *Sphagnum* or bog-moss, with the synonymy and geographical distribution of each species and variety. It will comprise 215 species, nearly 600 varieties, and more than 500 synonyms.

A TYPE-HERBARIUM of Lichens and a lichenological library have been instituted at Chambésy, near Geneva, under the direction of the curator of the Herbarium Boissier. In memory of a late distinguished lichenologist, it will be known as the "Salle Müller-Aargau."

MESSRS. WHITTAKER AND CO. will shortly publish a volume on "Organic Chemical Manipulation," by Dr. J. T. Hewitt. The first part of the book will give an account of the methods adopted in organic analysis and the determinations of molecular weight, the second part being devoted to a typical set of organic preparations, systematically arranged and intended to give an idea of the methods adopted in organic work.

THREE publications from three of our public schools have been received during the past few days. From Harrow School has come the second volume of "Harrow Butterflies and Moths," by J. L. Bonhote and Hon. N. C. Rothschild. The first volume of this praiseworthy work has already been noticed in NATURE (vol. lii. p. 388). The present volume includes the Macro-lepidoptera not described in the former volume, and eight of the Pterophoridae recorded from the Harrow district. The locality, time of appearance, and distinguishing features of the different species are noted; so that the volume will prove of service to collectors, as well as a record of permanent value to entomological science.—The Rugby Natural History Society have just issued their report for 1896. The papers printed in the report are on the Macro-lepidoptera of Hertfordshire, from personal observation, by H. W. Blathwayt; Lichens, by R. A. Worthington; the Aborigines of Australia, by C. Ansted; and Photomicrography, by K. Lucas. We are glad that the Society is able to give evidence of its vitality; for we regard the expeditions made by the members, and the encouragement given to individual observation, as of the highest educational value.—The report of the Marlborough College Natural History Society is even more complete than that from Rugby. It contains papers by E. Meybrick, on the vertebrate animals (except birds) of the Marlborough District, the cretaceous fossils of the district, and botanical classification, and also a paper on acids, by R. G. Durrant. The Society appears to be in a very flourishing condition, and the reports of the various sections testify to commendable enthusiasm of the members. A particularly interesting feature is the anthropological report containing statistics of weights and measurements of members of the school.

THE additions to the Zoological Society's Gardens during the past week include two American Flying Squirrels (*Sciuropterus volucella*) from North America, presented by Miss Lucy Sanderson; a Grey Squirrel (*Sciurus griseus*) from North America, presented by Mr. D. S. Millar; fourteen Common Chameleons (*Chamaleon vulgaris*) from Egypt, presented by Dixon Bey; two Eyed Lizards (*Lacerta ocellata*) from Southern Europe, presented respectively by Lieut.-Colonel Willoughby Verner and Mr. G. K. Gude; three Common Squirrels (*Sciurus vulgaris*), British; an Eroded Cinixys (*Cinixys erosa*) from West Africa, purchased; four Humboldt's Penguins (*Spheniscus humboldti*) from Western America, received in exchange; a Thar (*Capra jemlaica*, ♂), born in the Gardens.